

ON A COLLECTION OF FISHES FROM PARAGUAY, WITH A SYNOPSIS OF THE
AMERICAN GENERA OF CICHLIDS.¹

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The Indiana University has received from Prof. J. Daniel Anisits, of the National University of Paraguay, a large and well-preserved collection of fishes made during 1900 and 1901. The collection consists of about 750 specimens and was made in the following localities:

1. Rio Paraguay and Laguna Pasito; and Rio Paraz at Asuncion.
2. Estancia La Armonia, Department Caapucu near the Laguna Ipoá, the largest lake in Paraguay, and into which all the streams of the neighborhood empty. Collections were here made in the Arroyo Carumbey.
3. Laguna Ipacaray and its tributary Aregua, twenty-four kilometers east of Asuncion. The laguna is about on a level with the Rio Paraguay and connected with it by the Arroyo Yuqueri.
4. Rio Paraguay at Fuerte Olympo.
5. Laguna at Pirayu Paraguay.
6. Campo Grande Lagunitas, five kilometers from Asuncion.
7. Rio Apa, forming the northern boundary of Paraguay, and its tributaries Arroyo Pypucú, about one hundred and twenty kilometers from the Rio Paraguay.
8. Arroyo Trementina, a tributary of the Rio Aquido Canigi and Aquadas and Lagunitas along the Arroyo.
9. Arroyo Chagalalina, also a tributary of the Rio Aquido Canigi.
10. Toldocue Estero, near Arroyo Chagalalina.
11. Salamanca, a landlocked laguna on a mountain near the Arroyo Pypucú, and between Rio Apa and Rio Aquidaban.
12. Fazenda das Conchas, in a partially dried small laguna near Rio Branco, Matto Grosso, Brazil.

The collection contains also a series collected by Dr. Carl Ternetz in the Paraguay at Asuncion and at Descalvados, Matto Grosso, Brazil.

In the present paper we give a list of all the specimens received, with descriptions of new species. We have also prepared a synopsis of the genera of Cichlids.

¹ Contribution from the Zoological Department of Indiana University, No. 56.

NOTES ON THE SPECIES RECEIVED.²

1. *Potamotrygon hystrix* Müller and Henle. Raya, Yabeliri.

Eight specimens (No. 43). Laguna and Rio Paraguay, at Asuncion.

2. *Bunocephalus rugosus* sp. nov.

Type, No. 9,819, one specimen (No. 221). 40 mm. Laguna near Arroyo Chagalalina.

D. 5; A. 7; V. 6.

Body slender, greatest width in front of pectoral $2\frac{1}{3}$ in length. Head and body moderately deep; the greatest depth $7\frac{1}{2}$ in the length. The depth at the base of the dorsal spine $1\frac{1}{2}$ in the distance from the tip of the snout to the base of the pectoral spine.

The ridges and knobs of the head well developed. The skin over the snout and sides of the head very warty; the nuchal crest long and thin, extending $\frac{2}{3}$ the distance to the base of the dorsal. Just beyond its distal end is a small knob. On each side of the anterior end of the nuchal crest is a lateral crest. These lateral crests run $\frac{2}{3}$ the length of the nuchal crest, converging slightly. Further, on each side there are two prominent crests which pass obliquely downward and forward to the short, high, humeral crest.

The interorbital space very concave. The crests bounding it are the most prominent of any on the head. They arise just back of the anterior nares, and after enclosing an elliptical space end at the base of the nuchal crest. On each of these there are four prominent knobs, two just back of the eye, and two just in front of the nuchal crest. The eyes are placed laterally in these ridges.

The interorbital width equals the snout plus the eye.

The maxillary barbels reach to the middle of the pectorals. Mental barbels short, reaching $\frac{1}{3}$ the distance to the post mentals. Post mentals reaching to the anterior end of the gill cleft.

Coracoid processes parallel behind, their length $1\frac{2}{3}$ in the distance between them, the processes extending half-way to a perpendicular dropped from the base of the dorsal spine. The coracoid processes and ridges very similar to those of *B. bicolor*.

Humeral process extending about $\frac{1}{3}$ the length of the pectoral spine.

Pectoral pore small, round.

Skin everywhere covered with very conspicuous warts; those on the sides of the body and tail arranged in about 7 rows on each side.

² The numbers in parentheses are the ones used by Prof. Anisits to indicate the various lots he collected. The numbers of the types are those they bear in the register of the Indiana University. The common names are those collected by Prof. Anisits.

Distance of the dorsal from the tip of the snout $2\frac{2}{3}$ in the length. Pectoral spines twice as long as the coracoid processes, armed on both edges with long hooks, those on the posterior edge and on the proximal half of the anterior edge pointing inward, those on the distal half of the anterior edge pointing outward.

Color dark brown; the numerous warts white, giving a speckled appearance. The fins light brown, irregularly speckled and mottled with darker.

This species is most closely related to *B. gronovii* and *B. bicolor*. It agrees with *gronovii* in the distance of the dorsal spine from the tip of the snout and in having the keels and knobs of the head well developed. It differs from *gronovii* in having the coracoid processes only half as long.

It agrees with *bicolor* in having 7 anal rays, and in the general shape of the coracoid ridges and processes. It differs from *bicolor* in having the knobs and keels of the head better developed.

3. *Rhamdia quelen* (Quoy and Gaimard). Bagre or Mandii, Mandii guarú.

Four specimens (Nos. 25, 133, 148, 269). Estancia La Armonia; Asuncion and Campo Grande.

4. *Pimelodus ornata* Kner. Mandii guarú.

One specimen (No. 167). Laguna at Asuncion. Very rare. Prof. Anisits records taking another specimen in the Arroyo Trementina.

5. *Pimelodus albicans* (Cuv. and Val.). Mandii guarú.

Two specimens (Nos. 54 and 56). Rio Paraguay at Asuncion.

6. *Pimelodus clarias* (Bloch). Bagre amarillo, Mandii saiyu.

Three specimens (Nos. 197 and 263) of type *b*, as defined by Eigenmann. Arroyo Trementina and Rio Paraguay at Asuncion.

Seven specimens (Nos. 149, 166, 551). Rio Paraguay at Asuncion. The most abundant of the fishes.

7. *Pimelodus valenciennis* (Kröyer). Bagre and Mandii.

One specimen (No. 259). 20 cm. Laguna Ypacarai (Aregua). Anal rays 15.

8. *Iherinichthys labrosus* (Kröyer).

Nine specimens (Nos. 55, 150, 162, 163, 165). 10–19 cm. Asuncion, Rio Paraguay.

9. *Hemisorubim platyrhynchos* (Cuv. and Val.).

One specimen (No. 53). 42 cm. Asuncion, Rio Paraguay.

10. *Pseudoplatystoma coruscans* (Agassiz). Suruby.

Two specimens (No. 47). 40 and 48 cm. Asuncion, Rio Paraguay. This is a common market fish. It reaches a length of a meter.

11. *Sorubim lima* (Bloch and Schneider). Pico de pato = duck-bill.

One specimen (No. 48). 35 cm. Asuncion, Rio Paraguay. Rare

12. *Doras costatus* Linnæus.

One specimen (No. 130). 20 cm.

13. *Doras maculatus* Val. Armado and Ytagua.

One specimen (No. 51). 36 cm. Asuncion, Rio Paraguay. March, 1900.

A common market fish; meat of good flavor.

14. *Doras nebulosus* sp. nov.

Type, No. 9,837, one specimen (No. 129). 16 cm. Collected by Dr. Carl Ternetz, either in Matto Grosso or Asuncion.

Form elongate; depth below dorsal equals width. Caudal peduncle narrow, compressed, width $1\frac{1}{3}$ in height. Humeral processes with a narrowed base, point acute. Dorsal plate roof-shaped, prolonged back of the first dorsal ray in a narrow process. Fontanel elongate, ending in front in a groove extending to between the posterior nares. Humeral processes and bones of the top of the head finely granular. Opercles, suborbitals and prenasals entirely covered with skin.

Eye small, $7\frac{1}{2}$ in head, $3\frac{1}{2}$ in snout, 2 in interorbital. Center of eye as far from posterior nostril as this is from anterior nostril, and as far as the anterior nostril is from tip of snout.

Maxillary barbel scarcely reaching the gill opening. Mental barbels twice as long as eye; post mental barbels slightly longer.

Snout narrow, width just back of maxillary barbels 4 in head. Mouth inferior, width $1\frac{1}{2}$ in snout. A small band of intermaxillary teeth $\frac{1}{3}$ as long as mouth is wide, the width of the band $\frac{1}{3}$ in its length. Maxillary teeth in a triangular patch, slightly wider than the intermaxillary band and half as deep as wide.

Gill membranes separate to below the bases of the pectoral spines. Breast entirely covered with skin.

Lateral plates narrow, the first 5-6 without dorso-ventral wings. The lateral plates widest beneath the adipose, where their width is contained in depth of body $3\frac{1}{2}$ times. The median hooks the same height for the whole length.

A median series of 10-12 plates between the adipose and the caudal and a similar series of 10-12 between the anal and caudal.

Distance of the dorsal spine from tip of snout $2\frac{1}{2}$ - $2\frac{3}{4}$ in length of body. Dorsal spine about as long as the head, very strongly serrated on both edges; the spines on the posterior edge twice as long as those on the anterior edge. Distance of adipose from dorsal $4\frac{1}{3}$ in the length. Adipose low, its base $\frac{3}{4}$ longer than base of dorsal.

Anal fin rounded, its height $1\frac{2}{3}$ in head.

Pectoral spine similar to dorsal, reaching the 5th or 6th scute. Light brown, shading into lighter below, everywhere mottled and marbled with darker shades. The fins similarly colored.

Lat. plates 29-30; head $3\frac{2}{3}$; depth $4\frac{3}{4}$; D. I, 6; A. 13; V. 7; P. I, 8.

15. *Oxydoras knerii* (Bleeker). Armado, Ytagua-poschú.³

Two specimens (No. 52), 35 and 36 cm. Asuncion, Rio Paraguay (laguna). March, 1900. Very abundant; the commonest market fish.

One specimen (No. 131). Matto Grosso or Asuncion.

16. *Auchenipterus nigripinnis* Boulenger. Bagre.

One specimen (No. 71). 17 cm. Asuncion, Rio Paraguay (Pasito). Very rare.

17. *Trachycorystes striatulus* Steind.

One specimen (No. 61). 13 cm. Asuncion, Rio Paraguay. Taken alive from the stomach of a large Sorubim. It is not known to the fishermen.

18. *Loricaria rostrata* Spix.

Two specimens (Nos. 180 and 125), a male and a female. 300 and 220 mm. From the Arroyo Trementina and from a laguna near Asuncion, Rio Paraguay.

19. *Loricaria labialis* Boulenger. Maimingué,⁴

Eight specimens (Nos. 62, 151, 175, and 178). 130-240 mm. Asuncion, Rio Paraguay. Common, caught with seine. One specimen (No. 214), 130 mm., from Arroyo Trementina. Our specimens agree in nearly all respects with those described by Boulenger. The snout is slightly thicker and more acute. The labial fold is slightly fringed.

20. *Loricaria stübelli* Steindachner. Maimingué.

Thirteen specimens (Nos. 64, 177 and 179). From Asuncion, Rio Paraguay. Two specimens (Nos. 207 and 212), from the Arroyo Trementina. Nos 177 and 207 are males with broad under lip.

These specimens differ from Steindachner's figure of *stübelli* in the greater width of the interorbital, $3\frac{2}{3}$ in length of head.

21. *Loricaria lata* E. and E. Maimingué.

Nine specimens (Nos. 60, 163, 142, 175, and 210). 70-280 mm. Asuncion, Rio Paraguay. One specimen (No. 210) from Arroyo Trementina.

22. *Loricaria lamina* Günther.

One specimen (No. 124). 200 mm. Matto Grosso. Collected by Dr. Carl Ternetz.

³ Yta = stone, gúa = place, poschu = bad.

⁴ Maimi = old woman, gué = it was.

23. *Hypoptopomus thoracatum* Günther.

One specimen (No. 126). 80 mm. Matto Grosso. Collected by Dr. Carl Ternetz.

24. *Plecostomus commersoni* (Val.).

Two specimens (No. 113). 170 and 220 mm. Matto Grosso. Collected by Dr. Carl Ternetz.

25. *Plecostomus vermicularis* Eigenm. and Eigenm.

One specimen (No. 213). 70 mm. Arroyo Trementina. Caught in a fish trap.

26. *Plecostomus boulengeri* sp. nov.

Type No. 9.868, one specimen (No. 112). 10 cm. Co-type No. 9.869, one specimen (No. 112). 6 cm. Both specimens from Matto Grosso or Asuncion. Collected by Dr. Carl Ternetz.

Head pointed; a low ridge from between the nares to the snout; three distinct ridges on the back part of the head. Occipital process short, triangular, bordered by a single nuchal plate. The nuchal plates bicarinate. Only the upper lateral plates on the anterior part of the body keeled. The humeral ridges moderate, extending over the first 4-5 plates. Tip of the snout naked. Belly covered with small granular plates, except for a small area in front of each ventral. In the younger specimen the belly is entirely naked.

Eye $2-2\frac{1}{2}$ in interorbital, $2\frac{1}{2}-3$ in snout, $4-4\frac{1}{2}$ in head. Eye larger in the younger specimen, $2\frac{1}{2}$ in snout, $4\frac{1}{2}-4\frac{3}{4}$ in the head, 2 in the interorbital.

Base of dorsal fin equals distance from dorsal to posterior end of adipose dorsal. First dorsal ray $1\frac{1}{2}$ in the distance from dorsal to tip of snout, slightly longer than head. Last dorsal ray $1\frac{1}{2}-1\frac{3}{4}$ in first dorsal ray.

Caudal obliquely truncate; outer rays not produced.

Head and body covered with small round spots; those on the head minute; those on the belly large, leaving a mere reticulation of the lighter ground color. The fins reddish, the dorsal with four rows of large round spots; in each row a single spot on each interradiation membrane. In the larger specimen the two upper rows are indistinct; in the younger specimen all the dorsal spots are indistinct. Caudal with four oblique bands. The pectorals and ventrals each with four dark bands. Anal dusky with a single band.

Lat. plates 26; head $4\frac{1}{2}$; depth 5; D. I. 7; V. 5; A. 5; P. I. 6.

This species is evidently related to *commersoni*, *scabriceps* and *plecostomus*. It agrees with the latter in the number of lateral scutes.

It is distinguished by the oblique dark bar on the caudal, less distinct than the rows of spots on the dorsal which toward the tip of the fin are also partially resolved into bars.

27. *Cochliodon cochliodon* (Kner).

Two specimens (No. 211). 230 and 300 mm. Arroyo Trementina. Caught in a fish trap. One specimen (No. 111). Matto Grosso?

28. *Pterygoplichthys anisitsi* sp. nov. Maimingué.

Type No. 9,873. 42 cm. (46.) Co-types 9,874 and 9,875. Two specimens (No. 46). 40–42 cm. Called La Vieja in Spanish and Maimingué by the natives. Laguna of the Rio Paraguay at Asuncion. Caught with seine; very abundant.

Form slender; depth under dorsal $1\frac{1}{3}$ in the width. Caudal peduncle slightly compressed. Head depressed, length $1\frac{1}{3}$ in width, depth $1\frac{1}{3}$ in length. An occipital ridge. Occipital process narrow, the sides almost parallel, bordered by three nuchal plates. All dorsal and lateral scutes carinate, each carina with short spines. Tip of snout granular. Thorax and abdomen entirely granulose.

Eye $4\frac{1}{3}$ –5 in snout, 4 – $4\frac{1}{2}$ in interorbital, 6–7 in head. Preopercle erectile.

Base of dorsal longer than distance from dorsal to base of caudal. Distance from the dorsal to the adipose contained in the length of the dorsal $1\frac{3}{4}$ – $2\frac{1}{4}$ times. Distance of dorsal spines from snout $2\frac{1}{2}$ times in length, the spine once in the head. The tips of the last dorsal rays reach slightly more than $\frac{1}{2}$ distance to adipose spine.

Adipose spine hooked, compressed, covered with short spines, especially the curved end.

Caudal oblique, not emarginate; outer rays heavy, the dorsal one somewhat compressed, not produced beyond the other caudal rays. Height of anal $1\frac{1}{2}$ in head. Ventrals equal length of head. Pectoral spine reaching half the length of the ventrals.

Body dark, almost black, covered on the sides and belly with lighter vermiculations. Passing caudad the vermiculations of the sides are gradually replaced by spots. Back of the dorsal one spot on each plate, so that the caudal peduncle has several longitudinal rows of moderately large spots. The head with the same dark ground color both above and below, uniformly covered with small light-colored spots, those on the posterior part of the head larger and gradually passing into the vermiculations of the sides.

The interradiar membrane of the dorsal, caudal, ventrals and pectorals dark, obscurely spotted, but in the darker individuals entirely black. Anal membrane dusky with obscure spots. The rays of all

the fins light with dark spots. Head $4-4\frac{1}{2}$; D. I, 11; A. 5; Lat. l., 29-30.

29. *Pterygoplichthys juvenis* sp. nov. Maimingué.

Type No. 9,876, one specimen (No. 92). 4 cm. Caught with seine at Asuncion, Rio Paraguay, April, 1900.

Form slender, depth under dorsal $1\frac{1}{2}$ in width. Caudal peduncle compressed.

Head moderately elevated, its length slightly greater than its width. Two occipital ridges. Nuchal plates rudimentary. Occipital process broad and triangular. Preopercle erectile; 8-12 teeth on each side in each jaw.

Eye $2\frac{1}{3}$ in snout, 2 in interorbital, 4 in head.

Snout and suborbital regions naked. Under side of head, breast and belly naked. Dorsal and lateral scutes carinate.

Base of dorsal equals distance from dorsal to base of caudal. Distance of dorsal spine from tip of snout contained in the length $2\frac{1}{3}$ times. No adipose. Caudal oblique, not emarginate, $\frac{1}{4}$ of total length. Height of anal $1\frac{1}{2}$ in head. Ventrals equal in length to head, reaching base of anal. Pectoral spine reaching base of ventrals.

Color uniform black, except breast and belly which are silvery. All the fins with alternating light and dark crossbars. Dorsal with 6 horizontal bands alternately transparent and black, the base transparent, the top black. Anal with four similar bars similarly arranged. Caudal with 7-9 alternating bars, the light ones less distinct.

Lateral plates 27; head $3\frac{3}{4}$; D. I, 12.

This species may be the young form of the three adult specimens (*Pterygoplichthys anisitsi*) caught at Asuncion; but no trace of adipose dorsal could be detected.

30. *Ancistrus cirrhosus dubius* Eigenm. and Eigenm.

One specimen. 55 mm. The specimen is so badly mutilated that the identification is doubtful.

31. *Callichthys callichthys hæmaphractus* (Hensel).

One specimen (No. 265), young. 5 cm. Campo Grande.

32. *Haplosternum pectoralis* (Boulenger).

Four specimens (No. 101). 7-9 cm. Rio Branco, Matto Grosso.

33. *Haplosternum littorale* (Hancock).

Two specimens (Nos. 23 and 24). 18 and 19 cm. Arroyo Carumbey and Yajamar, Estancia La Armonia.

These specimens fit the description of *littorale* in the "Nematognathi of South America" by E. and E. Two other specimens (No. 155)

from a small lagoon in Campo Grande, 5 kilos from Asuncion and the Rio Paraguay, differ from the first two in having the posterior margins of the anterior pair of nuchal plates very much rounded. In fact, the posterior border on either side lies for $\frac{2}{3}$ its length at right angles to the axis of the body. They differ also in being of a uniform dull lead color and in the size of the eye— $6\frac{1}{2}$ in the interorbital. The two specimens differ as follows:

Specimen *a*, 21 cm. (♂?). Pectoral spines as long as head. In this specimen, which is probably a male, the skin along the under side of the pectoral rays is greatly thickened, forming along each ray for $\frac{3}{4}$ its length a heavy ridge.

Specimen *b*, 18 cm. (♀?). Pectoral spines $1\frac{2}{3}$ in head.

KEY TO THE SPECIES OF CORYDORAS.

- a*. Coracoid processes meeting on median line of anterior portion of belly at least.
- b*. A dark brown lateral band extending from the occiput backward on the upper half of the body; ventral surface and a broad vertical band behind the eye light; caudal without bars, . . . *eques*.
- bb*. Greenish, fins and top of head brown; a dark brown band on caudal. D. I, 9; Lat. pl. $\frac{2\frac{1}{2}}{3}$, *splendens*.
- aa*. Coracoid processes nowhere meeting; breast and belly with a median naked area.
- c*. Caudal plain.
- d*. Body with one or more dusky longitudinal bands; dorsal fin usually spotted.
- e*. Coracoid processes moderately expanded, leaving only a narrow naked area between them; occipital process triangular, pointed at the tip; a dark band extending from the upper caudal lobe forward, one or more longitudinal series of dark spots along the sides, *elegans*.
- cc*. Coracoid process scarcely encroaching on breast or belly. A blackish lateral band extending from the middle caudal rays forward.
- f*. Eye $2-2\frac{1}{2}$ in snout, 4-5 in head, $2-2\frac{1}{2}$ in interorbital. First 4-5 dorsal rays as long as the dorsal spine, *microps*.
- ff*. Eye $1\frac{1}{2}$ in snout, 4 in head, 2 in the interorbital. First 2 dorsal rays as long as the dorsal spine, *nattereri*.
- dd*. Body without longitudinal bands; dorsal plain. D. I, 7; A. I, 6; P. I, 7-8; V. 6.
- g*. Head and dorsal plates deep bronze; ventral plates yellowish; all the fins immaculate; opercle, humeral and nuchal plates iridescent blue; base of the dorsal fin shorter than the distance between the dorsal and adipose; depth less than $\frac{1}{2}$ of total length; eye $4\frac{1}{2}$ in head, more than 2 in the interorbital (Gill), *aneus*.

- gg. Olive, the 9 or 10 anterior scutes with vertical series of blackish spots; base of the dorsal fin equal to the space between the dorsal and adipose fins; depth $3\frac{1}{2}$ in the total length; eye about 3 in the head; spines of the fins very strong and long, dorsal spine as high as the body, pectoral spine shorter; 4-5 azygos shields (Günther), *armatus*.
- cc. Caudal fin with 4-5 dark vertical bars; dorsal with dark markings.
- h. Dorsal fin with 2 irregular crossbars; sides of body with series of dark blotches; middle of the lower fins blackish, . . . *paleatus*.
- hh. A dark vertical bar on the first dorsal rays, sometimes extending on to the body below; anal fin barred or spotted; ventrals and pectorals plain, *punctatus*.
- hhh. Dorsal fin with 5 longitudinal rows of dark spots; 6 narrow bars on caudal. Top of head tinged with brown; a yellowish band across snout, otherwise the fish without color, . . *aurofrenatus*.
- hhhh. Dorsal with black spot on ends of rays.
- i. Anal spotted; dark brown above, 3 series of dark spots along middle of side, *trilineatus*.
- ii. Anal plain.
- j. Lat. plates $\frac{22}{21}$; azygos plates none; a pale band on side; clavicle and opercle with blue reflections (Cope), *acutus*.
- jj. Lat. plates $\frac{21}{18}$; azygos plates 4; numerous dark dots on the side shields which are wanting on middle line of side; a black spot at the base of the dorsal spine (Cope), *amphibelus*.
- ccc. A hastate black spot at base of caudal fin, margined behind by white; a black lateral band, *hastatus*.

34. *Corydoras microps* sp. nov.

Type No. 9,892, one specimen (No. 100). From a small lagoon, half dry, near the Rio Branco (Matto Grosso, Brazil), where there were thousands of these fishes. Co-types No. 9,893, three specimens (260). From Aregua, in a brook which empties into the Laguna Ypacara. Sides metallic green. June, 1901. Co-types No. 9,894, one specimen (No. 236). Aguadas, near the Arroyo Trementina. December, 1900. Co-types No. 9,895, two specimens (No. 215). $1\frac{1}{2}$ cm. From Arroyo Pypucú. January, 1901.

Short, deep, ventral outline almost straight to base of anal. Profile steep to nostrils, less steep and evenly rounded from nares to dorsal.

Eye $2-2\frac{1}{4}$ in snout, $4\frac{1}{2}-5$ in head, $2\frac{1}{3}-2\frac{1}{2}$ in interorbital.

Mouth inferior, snout conical; maxillary barbels scarcely reaching gill-openings, labial barbels slightly longer. Fontanel elongate, narrow, extending into the base of the occipital.

Coracoid processes narrow. The distance between them equals $\frac{1}{2}$ distance between bases of pectoral spines.

Three to four azygos plates before the adipose fin.

Distance of dorsal spine from tip of snout 2 in length; the spine $1\frac{2}{3}$ in head; roughened behind; first 4-5 rays higher than the spine.

Pectoral spine $1\frac{1}{3}$ - $1\frac{2}{3}$ in head, outer side smooth, inner roughened.

Caudal deeply forked, $2\frac{1}{2}$ -3 in length, its dorsal lobe slightly longer.

Color yellowish-brown changing to white below; a light middorsal band, extending from fontanel to base of caudal. At the base of the dorsal this band widens into a dark spot. A lateral band starts at the base of the caudal and widens as it passes forward, to end in a more or less distinct lateral spot. All the fins are plain.

Three of the specimens (260) are darker. The lateral band is not distinct from the middorsal. The top and sides of the head, the dorsal and caudal fins are tinged with dark.

Lat. plates $2\frac{2}{3}$ - $2\frac{3}{4}$; D. I. 7-8; A. 7-8; V. 6; P. I. 8-9.

These specimens, measuring between 15-60 mm., differ from the adult in having the eye $1\frac{1}{2}$ in the snout, 3 in the head, and $1\frac{1}{3}$ in the interorbital. Depth $2\frac{1}{2}$, head $2\frac{2}{3}$, dorsal spine $1\frac{2}{3}$ in head, pectoral spine $1\frac{1}{3}$ in head.

This species stands nearest to *nattereri*, from which it differs in having the eye smaller, snout more conical and in the shape of the dorsal fin.

35. *Corydoras aurofrenatus* sp. nov.

Type No. 9,891, one specimen (235). 55 mm. Aguada, near Arroyo Trementina. December, 1900.

Body elongate, fins and head small. Profile obtusely angled between the nares, steep from the nares to the snout. Fontanel very elongate, extending to the base of the occipital process. Width of occipital $1\frac{1}{4}$ in its length.

Eye 2 in snout, $1\frac{1}{4}$ in interorbital, $3\frac{1}{2}$ in head.

Snout conical, somewhat compressed. Posterior margin of opercle slanting downward and forward. Distance from upper end of gill-opening to eye equal to diameter of eye. Labial barbel reaches gill-opening; maxillary barbel slightly shorter. Mental barbels equidistant from each other and the angles of the mouth.

Coracoid process scarcely encroaching on the breast or belly.

Three to four azygos plates before the adipose.

Distance of dorsal spine $2\frac{1}{8}$ in length; its height $1\frac{1}{3}$ in length of head. First two dorsal rays exceed the spine. A band of spines, similar to those on the plates, along the anterior edge of the spine. A similar band but narrower on each lateral edge of the spine; the posterior edge roughened. Caudal forked for half its length; about $2\frac{2}{3}$ in the length.

Pectoral spine similar to dorsal in length, a similar spinous band along its upper anterior edge, posterior edge serrated.

No color on sides, belly or breast. Top of head slightly tinged with brown. A broad yellow band across the snout. Dorsal colorless except for dark spots on the rays, arranged in 5 longitudinal rows. A vestige of a sixth row on the tips of the first and second rays. The rays of the caudal similarly spotted, the spots arranged in about 6 vertical rows, giving the appearance of 6 narrow bars. The adipose, anal, ventrals and pectorals plain.

Head 4 in body; depth 3; D. I, 7; A. 7; V. 6; P. I, 9. Lateral plates $2\frac{3}{8}$.

This species stands nearest to *punctatus* and *triincaus*. From both it differs mainly in coloration.

36. *Hoplias malabaricus* (Bloch). Tareui.

Thirteen specimens (31, 58, 107, 154, 196, 231). Estancia La Armonia; Arroyo Carumbey; Asuncion; Rio Branco, Matto Grosso; Arroyo Trementina; Arroyo Chagalalina.

37. *Hoplerythrinus unitæniatus* spix. Tareui.

Four specimens (57, 98, 99, 239). Estancia La Armonia; Rio Branco, Matto Grosso.

38. *Pyrhulina australe* sp. nov.

Pyrhulina semifasciata Boulenger. Trans. Zool. Soc. London, XIV, part II, 1896 (not of Steindachner).

Type No. 9,901 (254), 50 mm. Arroyo Trementina.

Co-types No. 9,901, 21 specimens (254). 30–50 mm. Arroyo Trementina.

Co-types No. 9,900, 13 specimens (227). 33–48 mm. Arroyo Chagalalina, Laguna.

This species is evidently closely related to *P. semifasciatus*, from which it differs largely in coloration. A conspicuous jet-black band, much narrower than the pupil, extends forward from the eye around the tip of the lower jaw. In these specimens preserved in formalin it is not possible to say whether the band extends through the eye. No distinct streak behind the eye on upper part of opercle. No spots or streaks on the body.

Head 4; depth $4\frac{1}{4}$; Lat. l., 20–23; D. 8–10; A. 10 or 11.

Teeth of the dentary slightly larger at their lateral ends.

Four specimens from Estancia La Armonia, Arroyo Carumbey may be referred to this species. They differ in coloration. The band around the snout is continued back through the eye, where it is consid-

erably wider than in front of the eye, and along the upper part of the cheek and opercle, where it is still wider and much less intensely black, merging into the color of the body and top of head. Body unspotted, dark above, lighter below.

39. *Psectrogaster curviventris* sp. nov. Blanquillo.

Type No. 9,919, 180 mm. (36). Asuncion, Rio Paraguay.

Co-type No. 9,918, 195 mm. (36). Asuncion, Rio Paraguay.

Co-type No. 9,920, 183 mm. (83). Asuncion, Rio Paraguay.

Co-types No. 9,921, 3 specimens, 107–122 mm. (34). Asuncion, Rio Paraguay.

Co-types Nos. 9,936–9,937, 2 specimens, 145 and 160 mm. (145, 234). Fuerte Olimpo, Rio Paraguay.

This species is closely related to *Psectrogaster rhomboides*, from which it differs in a number of characters, notably the ventral outline, the number of fin rays and scales.

Head $3\frac{1}{2}$ – $3\frac{1}{4}$ ($3\frac{1}{6}$ in smallest specimen): depth 2 – $2\frac{2}{3}$ ($2\frac{1}{4}$ + $2\frac{2}{3}$ in *rhomboides*); D. 10 or 11 (12 or 13 in *rhomboides*); A. 9 or 10 (10 or 11 in *rhomboides*); Lat. l. 48–52 (53–58).

Compressed and deep, the depth usually 2 in the length, rarely less, $2\frac{2}{3}$ in No. 9,937. Ventral outline regularly arched, without an angle at the origin of the ventral; dorsal outline less regularly arched, the base of the dorsal oblique; the region between dorsal and nape strongly arched, top of head depressed.

A narrow adipose lid in front and behind. Eye $3\frac{1}{5}$ – $3\frac{1}{2}$, equal to the snout and anterior adipose lid, 2 in interorbital.

Scales on back small, becoming larger on the sides and largest on breast. Scales all ctenoid, becoming pectinate on breast.

Air bladder extending little, if any, beyond origin of anal.

Origin of dorsal as in *rhomboides*, equidistant from tip of snout and upper caudal fulcrum or a little nearer caudal; the highest ray about equal to the length of the head or shorter. Caudal broad and deeply notched. The middle rays only $\frac{1}{3}$ the length of the longest outer rays, outer rays leathery. Anal short, emarginate, the tip of the longest ray reaching tip of the last. Pectorals not reaching ventrals except in 9,937; ventrals about $\frac{2}{3}$ to vent.

Plumbeous above, bright silvery below, indications of bright stripes along the rows of scales above the lateral line and between the rows below the lateral line. In 9,936 and 9,937 (preserved in formalin) there is no metallic silvery and there is a dark band along the posterior half of the lateral line, increasing in width and intensity toward the tail. No. 9,937 evidently in shape and color approaches *rhomboides* most closely.

40. *Curimatella alburnus australe* var. nov. Blanquillo.

Type 9,929, one specimen (65). Asuncion.

A single specimen differs from the typical northern *alburnus* in having the predorsal region trenchant with a strong median and indistinct lateral keels, and in having 33 scales in the lateral line instead of 36-38. It approaches var. *lineatus* in the number of scales, but has no middorsal line.

41. *Curimatus gillii* sp. nov.

Type No. 9,939, 47 mm., Arroyo Trementina (242).

Co-type No. 9,938, 57 mm., Chagalalina (230).

These two small specimens represent apparently a new species related to *C. spilurus*. It certainly differs from *C. nasus* and *bimaculatus* the only other species of *Curimatus* that have been taken in the Arroyo Trementina.

Caudal lobes naked; postventral region rounded; sides in formalin specimens with an obscure lateral band terminating in a large, well-marked spot on the end of the caudal peduncle.⁵ Dorsal plain.

Head $3\frac{1}{3}$; depth $2\frac{3}{4}$; Lat. line 30 or 31; D. 10 or 11; A. 9.

Long elliptical, dorsal and ventral profiles equally arched. Pre-ventral region flattened, with a median series of large scales; postventral region rounded. Predorsal region narrow, rounded, a triangular groove over the occipital process.

Scales of the sides all crenulate.

Profile gently arched; eye 3 in head, $1\frac{1}{2}$ in interorbital. Origin of dorsal midway between tip of snout and base of caudal in the type and between tip of snout and tip of adipose in the co-type. Origin of ventrals nearer caudal than tip of snout. Pectorals not to ventrals; ventrals to anus.

For Dr. Theodore Gill, in recognition of his valuable contributions to the knowledge of the Characinoids.

42. *Curimatus nasus* Steindachner.

Two specimens from Arroyo Trementina (186), preserved in formalin, have a plumbeous lateral band about as wide as the eye.

43. *Curimatus elegans paraguayensis* var. nov. Mojarra.

Type No. 9,928, one specimen (18 in part), 135 mm. Estancia la Armonia, Arroyo Carumbey.

Co-type No. 9,954, one specimen (87), 100 mm. Asuncion, Rio Paraguay.

⁵ The pigment cells of the lateral band are deeper in position than those forming the caudal spot and would probably not be apparent in specimens preserved in alcohol. Certainly other specimens preserved in alcohol show no band, while specimens in formalin show a band.

This variety differs from *bahiensis* in the number of its scales. Depth in the type $2\frac{3}{5}$, scales 38; in the co-type $2\frac{1}{5}$, scales 39.

44. *Curimatus bimaculatus* Steindachner. Blanquillo.

This species, heretofore known from the Amazonas, is represented by typical specimens from Estancia La Armonia (18 in part); Arroyo Trementina (189); Rio Paraguay at Asuncion (65, 140, 170). Specimens preserved in formalin have a broad, dark lateral band and a conspicuous dark spot in front of the dorsal.

45. *Curimatus gilberti* Quoy and Gaimard.

Two specimens from Estancia la Armonia.

46. *Anodus latior* (Spix). Blanquillo.

Three specimens (35 and 97), from Rio Paraguay at Asuncion and Fuerte Olimpo.

47. *Prochilodus scrofa* Steind. Zabalo; Carimbata.

Six specimens, Asuncion, Rio Paraguay (Nos. 40, 81, 174); Estancia La Armonia (19); Arroyo Trementina (205); one specimen received from Dr. von Ihering from Piracicaba.

48. *Hemiodus orthonops* sp. nov.

Type No. 9,955 (202), Arroyo Trementina, 150 mm.

Co-types Nos. 9,956–9,960 (171, 50, 4, 77), five specimens, 170–225 mm. Laguna of Rio Paraguay at Asuncion.

A slender, small-scaled species. Dorsal profile from tip of snout to origin of dorsal slightly but evenly arched. Ventral profile from tip of snout to insertion of ventrals of a like even curvature. Dorsal profile from origin of dorsal to caudal peduncle nearly straight. Ventral profile from insertion of ventral to origin of anal slightly convex, rising abruptly from origin of anal to caudal peduncle. Depth of caudal peduncle $2\frac{3}{5}$ in head.

Head subconical, flattened above and on the sides. The lower side of the mandible flattened. Mouth in the ventral profile. The rami of the mandible approaching each other posteriorly. Maxillary short, partly sheathed under the broad preorbital. Mandible toothless. Premaxillary with a single series of about 24 movable, short, flat, serrated teeth.

Eye large, $3\frac{1}{2}$ in head, 1 in snout, covered, with the exception of a short slit over the pupil, by broad adipose lids.

Suborbitals covering cheek, with exception of a narrow space just above the horizontal branch of the preopercle. Branchiostegal rays 4, flat and overlapping each other. Opercle semicircular. Subopercle

of moderate depth. Gill membranes free from each other and from the isthmus.

Dorsal moderately high, its base $1\frac{2}{3}$ in its height. Adipose long with a small base.

Caudal widely emarginate, its lobes leathery, generally worn off round. Pectorals small, reaching $\frac{2}{3}$ distance to insertion of ventrals. Ventrals large, inserted under the latter half of the dorsal, reaching $\frac{2}{3}$ distance to the vent. Anal small, its posterior border emarginate. When closed the tip of the third ray reaching tip of last ray.

Scales above lateral line smaller than those below.

Color bluish-gray $\frac{2}{3}$ distance down to lateral line, below this silvery-white. A conspicuous oval black spot just above lateral line back of the dorsal. The tip of the caudal lobes dusky, each caudal lobe with a dusky band running nearly parallel with its outer margin and about three rays removed from the margin. The other fins immaculate.

Scales 19 or 20-84 to 92-10 or 11; depth $3\frac{5}{6}$; head $4\frac{2}{3}$; D. 11; A. 11; P. 18; V. 11; eye $3\frac{1}{2}$ in head.

This species stands nearest to *H. microlepis*, from which it differs in the larger scales.

49. *Paradon tortuosus* Eigenmann and Norris.

One specimen (187), Arroyo Trementina.

50. *Paradon affinis* Steindachner. Piki.

Forty specimens of this species, from the Rio Paraguay at Asuncion (90 and 5), agree with Steindachner's description in all but the dentition of the lower jaw. There are no teeth on the sides.

51. *Anostomus fasciatus* (Agassiz). Boga.

Two specimens, Rio Paraguay at Asuncion (80) and Estancia La Armonia (28).

52. *Leporinus hypselonotus* Günther. Per-do-folha.

One specimen (110), Asuncion or Matto Grosso?

53. *Leporinus conirostris* Steindachner. Boga.

One specimen (82), Asuncion, Paraguay.

54. *Leporinus trifasciatus* Steindachner. Boga.

One specimen (39), Rio Paraguay at Asuncion.

55. *Odontostilbe paraguayensis* sp. nov.

Type No. 9,988, a single specimen, 40 mm. (95). Asuncion.

Co-types No. 10,111, three specimens, 40 mm. (251 in part). Arroyo Trementina.

Depth $2\frac{3}{4}$; head $3\frac{3}{4}$; D. 11; A. 21; scales 6-32 or 33-4.

Much compressed, back conspicuously elevated, the anterior profile straight, the upper profile strongly arched, descending backward from in front of dorsal. Eye greater than snout, about 3 in head, slightly less than interorbital. Intermaxillary with six teeth in each side, each with an inconspicuous median cusp and 3 to 4 graduated lateral cusps; the cusps of the teeth becoming more nearly of the same size and the tooth rounded toward the side. Maxillary with 2 seven- to eight-pointed broad-tipped teeth. Mandible with 4 broad, seven-pointed teeth; the middle point is largest, the tip spatulate. A few small teeth on the sides of the lower jaw.

Origin of dorsal over origin of ventrals, slightly nearer tip of snout than base of caudal, its highest ray about equal to the length of the head. Caudal lobes longer than head. Pectorals reaching ventrals; ventrals not to anal.

In alcohol: Lower half of body metallic-silvery, a silvery lateral band. A conspicuous caudal spot continued on the base of the middle caudal rays; a dark band at base of caudal. A dusky band on middle of back behind anal. Dorsal without dark spot, its first membrane dark; other fins immaculate. In the co-types the anal reaches 22, the scales 34 or 35, head $3\frac{1}{3}$ - $4\frac{1}{3}$. Eye $2\frac{2}{3}$.

56. *Odontostilbe trementinae* sp. nov.

Type No. 9,987a (251 in part), 47 mm. Arroyo Trementina.

Co-types No. 9,987, 9 specimens (251 in part). Arroyo Trementina.

One other specimen was taken at Asuncion, and two others from a brook near the Arroyo Trementina.

This species resembles *H. peguira* in the color of the dorsal, but beyond this there is no similarity.

Depth 3; head 4; D. 11; A. 21; scales 6-34-4.

Two broad-tipped teeth on the maxillary, each with about 7 points. Intermaxillary with 6 spear-tipped teeth on each side, each with a large long median point and two or three short, graduated lateral points. Lower jaw with about 9 three- to six-pointed teeth on the sides, the first one large, the others small and decreasing in size backward; about 6 broad teeth on the dentary, each with 3 lobes of equal size, each lobe being indistinctly three-pointed. They appear as 3 distinct teeth. Maxillary reaching beyond anterior margin of eye.

Dorsal equidistant from tip of snout and base of middle caudal rays, behind the ventrals. Pectorals not to ventrals, ventrals not to anal.

In formalin: A conspicuous hastate caudal spot, extending forward as a faint dark line to below the dorsal where it fades out. A dark

area over the caudal spot. Anterior dorsal rays with a black spot near their tip. A yellowish humeral spot.

The anal in the co-types reaches 24 rays; Lat. l., 34-37; depth $2\frac{3}{5}$ -3.

The specimens from the brook (255 in part) are very slender, depth $3\frac{1}{4}$ and $3\frac{3}{5}$ in the length. The dark markings are intense. The first developed dorsal ray of one is prolonged in a filament which reaches the adipose.

57. *Cheirodon interruptus* (Jenyns).

a. Ten specimens (No. 266), 28-42 mm., from Campo Grande, June, 1901, show the following characters:

	Min.	Max.	Average.
Length in mm.....	25.0	42.0	31.6
Anal rays	22.0	27.0	
Depth	2.5	2.8	
Head.....	3.6	4.0	
Eye	2.6	3.0	
Teeth in maxillary.....	0	1	
Perforated scales.....	6	8	6.56

Scales 5.5 to 6-31 to 32-4 to 5.

b. Thirteen specimens (part of No. 251), 25-40 mm., from a brook near Arroyo Trementina show the following characters:

	Min.	Max.	Average.
Length in mm.....	18.5	34.0	27.81
Anal rays	21	23	
Depth	2.4	3.2	
Head.....	3.0	4.2	
Eye	2.2	3	
Teeth in maxillary	0	0	
Perforated scales	5	11	

Scales 5 to 7-30 to 36- $4\frac{1}{2}$ to 6.

The specimens mentioned above, compared with the description of *interruptus*, give the following results:

Specimens.

Anal 20-27.

Scales 30- $36\frac{5-7}{4-6}$.

Depth $2\frac{2}{3}$ - $3\frac{1}{10}$.

Head 3- $4\frac{1}{5}$.

Dorsal 10-11.

Descriptions.

Anal 19-20.

Scales 35 $\frac{5}{4}$.

Depth $2\frac{1}{2}$.

Head 4.

Dorsal 11.

Pectorals fall short of, reach to or slightly overlap ventrals.

A large, black caudal spot.

A dusky band from tail to below dorsal.

Pectorals extend beyond root of ventrals.

A black spot at the base of the caudal.

Sides with a bright longitudinal band.

58. *Cheirodon annæ* McAtee sp. nov.

Type No. 4,301a, 43 mm. South America.

Co-types No. 4,301 (14 specimens). South America.

This species bears considerable resemblance to *pisciculus*, from which it may be distinguished by the absence of more than one maxillary tooth; the head 3-4 instead of 5, and the dorsal 9-12 instead of 10.

Depth $3\frac{2}{5}$; head $4\frac{1}{5}$; D. 11; A. 15; scales 7-32-5. Four five-pointed teeth on each side of the intermaxillary, the median points longest. Maxillary with a single four-pointed tooth, but little smaller than those of the intermaxillary. In the lower jaw there are six four-pointed teeth on each side, largest in the middle and grading to quite small ones at the sides.

Origin of the dorsal nearer the base of the caudal than tip of snout. Pectorals not to ventrals; ventrals not to anals. Coloration (in alcohol) dark olive; belly light golden; a silvery band from base of caudal to angle of opercle margined above by blackish. Sides of head silvery.

The co-types show considerable variation. Some have 5 teeth on each side of intermaxillary and lower jaw. Two have no teeth in the maxillaries. Other variations as follows:

Dorsal 9-12; anal 12-15; scales 6 or 7-32 to 36-5 or 6; depth $4\frac{1}{5}$ - $3\frac{2}{5}$; head $4\frac{1}{5}$ - $3\frac{2}{5}$; eye in head $3\frac{1}{5}$ - $2\frac{4}{5}$.

Details of specimens:

	Min.	Max.	Average.
Length in mm.....	29.0	43.0	37.2
Dorsal.....	9.0	12.0	
Anal.....	12.0	15.0	
Depth.....	3.4	4.2	
Head.....	3.4	4.2	
Eye.....	2.8	3.2	
Teeth in maxillary.....	1	1	
Perforated scales.....	7	9	

Scales 6 to 7-32 to 36-5 to 6.

(The above description is by one of my students, Mr. Waldo Lee McAtee, who dedicates the species to his mother.—C. H. E.)

59. *Cheirodon insignis* Steindachner.

Chirodon insignis Steindachner, Fisch-Fauna des Cauca und Flusse bei Guayaquil, 22, Pl. VI, fig. 3, 1880 (Cauca.).

Cheirodon insignis Ulrey, Ann. N. Y. Acad. Sci., VIII, 291 (Para, Brazil).

A number of specimens of this species are in the collection. They were mostly confounded with *Hemigrammus luetkeni*. In all the specimens the caudal spot is large and sharply defined, not extending to the tip of the rays. It is bordered in front by an area of greater or

less extent which is entirely free from pigment, and behind by two yellowish spots. Three specimens (part of 253) are light straw color with a yellowish fatty humeral area; a faint dark line along the middle of the sides. In two of these the spines of the lower caudal are nearly typical, in the third they are weak. Arroyo Trementina.

Seven specimens (part of 219) are notably darker; in only one of these is the serration of the caudal spines typical. Young with a black lateral band. Arroyo Pypucú.

Nine specimens (257), slender, elongate, quite dark, three of them with the typical caudal serrature, the others with the caudal rays not spine-like. Arroyo Pypucú.

60. *Aphyocarax dentatus* sp. nov. Piki.

Type No. 10,030 (part of No. 6), 71 mm. Asuncion, Rio Paraguay (Laguna). November, 1899.

Co-types, four specimens. No. 10,038 (part of No. 6), 53-71 mm. Asuncion. One specimen, No. 10,033 (96), 70 mm. Asuncion. April, 1900. Six specimens, No. 10,030 and 10,031 (237 and 247), 33-60 mm. From Aguadas, near Arroyo Trementina. December, 1900. Four specimens, No. 10,036 (8), 65-80 mm. Asuncion, Rio Paraguay (Laguna). November 1899. Piki. One specimen, No. 10,037 (found with 90). From Asuncion, Rio Paraguay. April, 1900. Taken with a seine.

This species differs from *pusillus* and *alburnus* chiefly in the length of the snout and the maxillary and in the number of teeth in the mandible.

Elongate, ventral profile slightly more curved than the dorsal. Dorsal profile but slightly convex from the tip of the snout to the origin of the dorsal, from origin of dorsal to base of caudal straight.

Head small, 4 in length, its depth $1\frac{2}{3}$ in its length. The teeth in a single series above and below. Maxillary teeth largely concealed, covering over half the anterior edge in the young; less in the old on account of the great elongation of the maxillary. Maxillary short in young, increasing rapidly in length with age, scarcely reaching beyond origin of eye in young, to end of pupil in the old.

Mouth small, very oblique in young, large and horizontal in adult, the jaws equal. Second and third suborbital bones large, entirely covering the cheek. The opercle triangular, its width $1\frac{1}{3}$ in its depth.

The eye small, 1 in snout, 4 in the head, $1\frac{1}{2}$ in the interorbital.

The dorsal small, its height $1\frac{1}{4}$ in the length of the head. Its last ray $2\frac{1}{3}$ in its height. Depth of caudal peduncle little less than half the length of the head.

The caudal small, deeply divided, its lobes equal to the length of the head.

Pectorals reaching $\frac{2}{3}$ distance to ventrals. Ventrals reaching $\frac{2}{3}$ distance to origin of anal.

Height of anterior rays of anal equal to length of ventrals, the last half of the anal but half as high.

Color in alcohol, straw. A faint silvery band extending from base of caudal to below the dorsal fin. The lower lip black. The fins immaculate. A note of the collector with No. 237 states that the caudal fin is red.

Some of the examples preserved in formalin show the dorsal and pectorals edged with black in front. In a number of specimens the middle caudal rays are dusky.

	Min.	Max.	Average.
Length in mm.....	33.0	79.0	55.7
Anal.....	18.0	22.0	
Depth	3.4	4.0	
Head.....	3.8	4.0	
Eye	3.5	4.0	
Perforated scales	7	14	
Teeth { Intermaxillary.....	14	20	
{ Maxillary.....	9	13	
{ Mandibular.....	36	42	

Scales 5.5 to 7-36 to 39-4.5 to 6.

61. *Aphyocarax alburnus*?

A single specimen agreeing in many respects with *alburnus*, of which we have not the original description. Length 31 mm. A. 19. Scales $5\frac{1}{2}$ -36-4 $\frac{1}{2}$; depth 3; head $3\frac{3}{4}$; eye $2\frac{2}{3}$ in the head, 8 scales perforated; 14 intermaxillary, 2 maxillary and 18 mandibular teeth. Mouth very minute, snout little more than half the eye.

The specimen is deeper than in descriptions of *alburnus*.

62. *Aphyocarax anisitsi* sp. nov.

Type No. 10,028, 41 mm. (part of S). Asuncion.

Co-types No. 10,027, one specimen (No. 6). Asuncion.

No. 10,029, three specimens (No. 7). Asuncion.

No. 10,024, nine specimens (160). Campo Grande.

No. 10,026, six specimens (264). Campo Grande.

No. 10,031, one specimen (94). Arroyo Trementina.

No. 10,025, one specimen (226). Arroyo Chagalalina.

This species is very closely related to *alburnus* from the Peruvian Amazons. It differs from that species chiefly in the number of scales in the lateral line.

Description of the type:

Depth $3\frac{1}{2}$; head 4; D. 10; A. 19; scales 33, seven perforated. Slender, elongate; dorsal and ventral profiles equally arched. Head pointed, mouth small, oblique, the lower jaw slightly projecting; eye twice as long as snout, $2\frac{1}{2}$ in head. Seven teeth in each intermaxillary, 2-3 in each maxillary, 10 in each side of the mandible. Maxillary little beyond vertical from front of orbit.

Origin of dorsal much behind ventrals, equidistant from tip of snout and middle of caudal lobes. Caudal moderately forked. Pectorals reaching to ventrals, ventrals not to anal. None of the rays filiform.

Straw colored, upper surface peppered with pigment cells, tip of lower jaw and snout dusky. No distinct markings.

In the table below is given the measurements of 16 specimens:

	Min.	Max.	Average.
Length in mm.....	34.0	41.0	36.11
Anal.....	19.0	23.0	
Depth	3.0	3.75	
Head.....	3.75	4.2	
Eye	3.0	3.33	
Perforated scales	6	9	
Teeth { Intermaxillary.....	13	16	
{ Maxillary.....	2	3	
{ Mandibular.....	18	20	

Scales 5 to 5.5-30 to 34-4.5 to 6.

63. *Hemigrammus melasopterus* sp. nov.

Type No. 10,039 (245), 37 mm. From Aguada, near Arroyo Trementina. December, 1900.

Co-types No. 10,040, one specimen (244), 35 mm. From Aguada, near Arroyo Trementina, December, 19 .

Co-types No. 10,041, five specimens (216), 29-35 mm. Taken in a trap in the Arroyo Pypucú. January, 1901.

A moderately elongate species. Depth $2\frac{2}{3}$. Profile of snout abruptly rising, slightly concave at the nape, rising gently and convex to the origin of the dorsal. Lower jaw slightly projecting, maxillary toothless, long, extending obliquely downward and backward to the middle third of the eye. The upper edge of the opercle emarginate. The subopercle large.

Eye large, $2\frac{1}{2}$ in head, $\frac{3}{4}$ in interorbital, $\frac{1}{2}$ in snout.

Lateral line 34, incomplete, only the first five scales perforated.

The fins large. The height of the dorsal greater than the length of the head by $\frac{1}{3}$ the diameter of the eye. Last dorsal ray $2\frac{1}{3}$ in the highest ray.

Caudal deeply divided, its lobes subequal.

Pectorals reaching beyond the base of the ventrals.

Ventrals reaching beyond the origin of the anal.

Anal moderately high its entire length, its last ray $1\frac{1}{5}$ in the fourth ray, which equals the diameter of the eye.

Color: Top of head dusky. A deep V-shaped humeral spot. Dorsal almost black. The middle caudal rays black. The last five anal rays and the distal $\frac{2}{5}$ of the other rays black. The tips of the ventrals dusky. There is no caudal spot or lateral band.

In some of the co-types the tips and bases of the dorsal rays are white, the black band of the anal is narrower and the outer caudal rays are pigmented.

Related to *unilincatus* (Gill) and *elegans* Steind.

The following table of measurements shows the variations among the seven specimens:

	Min.	Max.	Average.
Length in mm.....	29.0	37.0	34.2
Dorsal.....	10.0	11.0	
Anal.....	27.0	28.0	
Depth	2.6	3.0	
Head.....	3.2	3.6	
Eye	2.4	2.5	

Scales 6.5 to 7.5-33 to 34-5.5 to 6.5.

64. *Hemigrammus lütkeni* Boulenger.

Tetragonopterus rivularis interrupta Lütken, Velhas Flodens Fiske, XIII, 215, 1875 (preoccupied by *Tetragonopterus interruptus* Jenyns=*Cheirodon interruptus*).

Tetragonopterus lütkenii Boulenger, Ann. and Mag. Nat. Hist., 1887 (Rio Grande do Sul).

Sixteen alcoholic specimens (29), the largest 35 mm. Estancia la Armonia.

Straw colored, a vertical humeral spot, a distinct caudal spot continued to the ends of the middle caudal rays, gradually narrowed and continued forward as a dark lateral band or line sometimes to the humeral spot, more frequently not so far.

Lateral line of the left side developed on 13, 24, 10, 13, 29, 11, 21, 10, 11, 25, 15, 10 (average 16) scales in as many individuals. In those with the longest lateral line some of the scales are simply notched, without a developed tube.

A large number of formalin specimens from Pypucú (219) and a few from Arroyo Trementina (253) differ from the above in that the dark lateral band or line abruptly joins the caudal spot, appearing as a marking independent from that spot, while in the specimens from La Armonia it seems to be a direct continuation of that spot. They are

much darker, which is probably due to the preservation and also to the locality. They differ also in having fewer scales with tubes.

Counts in 4 specimens from the Pypucú.

D.	A.	Scales.	Tubes in Lat. 1.
12	25	7 -33-4	9
?	23	7 -33-5	9
10	21	7 -34-5	10
10	21	$7\frac{1}{2}$ -35-5 $\frac{1}{2}$	10

A number of other specimens from the Pypucú, taken at random, have the following number of tubes: 14, 15, 9, 18, 10, 12, 12, 13, 8, 11, 8, 13 (average nearly 12).

65. *Hemigrammus kennedyi* Eigenmann sp. nov. Tareui.

Type No. 10,016, a specimen 57 mm. long (159). Campo Grande. February, 1901.

Co-types No. 10,063, 5 specimens taken with the type at Campo Grande.

Co-types No. 10,012, twenty-five specimens (267). Campo Grande. June, 1901.

Co-types No. 10,019, ten specimens (268). Campo Grande. June, 1901.

Co-type No. 10,018, one specimen (241). Arroyo Trementina.

This species closely resembles *Pacilurichthys multiradiatus* Steind. It differs widely from all other species of *Hemigrammus*.

Description of type:

Head $4\frac{1}{3}$; depth $2\frac{1}{6}$; D. 10; A. 46; scales 10-45-8.

Compressed, ventral profile regularly arched, its lowest point between ventrals and anal; dorsal profile depressed at nape, angulated at the origin of the dorsal.

Eye large, $\frac{1}{2}$ in snout, $2\frac{1}{3}$ in head, 1 in interorbital. Mouth small, maxillary reaching to eye, no teeth on its margin.

Suborbitals covering the entire cheek. Scales largest over pectorals. Lateral line extending, with interruptions increasing in size and frequency, to the last fourth of the anal.

Dorsal midway between tip of snout and caudal, directly over origin of anal; caudal deeply forked; anal low and long, its length slightly exceeding the height of the body; ventrals reaching to anal, pectorals beyond origin of ventrals.

A dark spot at base of caudal, a narrow dusky lateral band. Base of caudal rays and a spot just above the origin of the lateral line yellow.

The co-types vary in some respects from the description given above. Anal 40-46; Lat. 1., 40-45. In a few specimens there is a blackish

humeral spot just above the origin of the lateral line. The lateral line varies considerably in the degree of completeness. In three specimens at least it extends to the caudal, but is interrupted. In the majority it stops far short of the caudal.

66. *Pœcilurichthys scabripinnis* (Jenyns).

One specimen, 32 mm. (part of 219), Arroyo Pypucú. One specimen (228), Arroyo Chagalalina.

Scales 7-35-5; D. 11; A. 26-29; head $3\frac{3}{5}$; depth $2\frac{2}{3}$.

One tooth on the maxillary; a conspicuous lateral band from eye to the end of the middle caudal rays, diffuse on the head, narrow on the sides in front, darkest and widest on the caudal peduncle. No humeral spot. Back with numerous pigment cells.

Compressed. Mouth small, maxillary not reaching beyond anterior margin of eye. Eye $2\frac{1}{2}$ in head, greater than interorbital, snout $1\frac{1}{2}$.

Origin of dorsal behind ventrals, nearer caudal than tip of snout. Anal not falcate. Pectorals about to ventrals, ventrals to anal.

These specimens differ distinctly from *scabripinnis* in color, having a conspicuous black band. They were, however, preserved in formalin, which has a tendency to destroy the silvery structural bands and to bring out the underlying black pigmentary markings. The species is evidently closely related to *wappi* from British Guiana.

67. *Pœcilurichthys multiradiatus* Steind. Mojarra.

Ten specimens, 39-93 mm., from Asuncion (14, 70, 93, 137, 38, 168). These specimens differ from the typical *multiradiatus* of the Amazons in the number of rays and scales.

Anal 41-45 (40-41 in specimens from Teffe, the type locality).

Lat. line 45-47 (41-42 in the types). Depth $2-2\frac{1}{2}$ (2).

Caudal spot distinct, becoming faint with age; humeral spot indistinct or absent. Maxillary toothless, or with a single rather large caducous tooth near its upper end.

It is possible that these specimens represent a distinct species.

68. *Pœcilurichthys abramis* Jenyns. Mojarrita.

Three specimens, Asuncion (11); Arroyo Trementina (246).

Humeral spot oval, distinct; A. 30 and 32; scales 10-46-9 and 9-44-9. This species is very similar to *lacustris*.

69. *Pœcilurichthys maculatus lacustris* Lütken. Mojarra.

Twenty-three specimens, Asuncion (88, 84, 12), Estancia La Armonia (16), Arroyo Trementina (181, 251, in part 243).

Anal 27-31; lat. l. 37-40. In a number of specimens there is a black spot at the base of each scale of the sides, forming longitudinal stripes.

70. *Pœcilurichthys dichrourus* Kner.

Six specimens (No. 7 in part), Asuncion, Rio Paraguay. November, 1899. "Edible; taken in a fish trap; commonly called Piki."

Two specimens (251 in part), creek near Arroyo Trementina.

These specimens are slenderer than Kner's figure. There is a faint caudal spot. The middle caudal rays and the distal half of each caudal lobe black. Maxillary with one or two small teeth.

The following table shows the measurements of the eight specimens:

	Min.	Max.	Average.
Length in mm.....	34.0	48.0	41.1
Anal.....	24	28	
Depth	3.0	3.75	
Head.....	3.5	4.0	
Eye	2.4	2.6	

Scales 5.5 to 5.5-34 to 39-4.5 to 5.

71. *Pœcilurichthys agassizii* Steindachner.

Four specimens, Arroyo Trementina (240); Arroyo Chagalalina (229).

Head $3\frac{1}{5}$ - $3\frac{1}{2}$; depth $2\frac{2}{5}$ - $2\frac{1}{2}$; eye $2\frac{2}{5}$ - $2\frac{3}{4}$ in the head; A. 24-26; Lat. l., 25.

72. *Pœcilurichthys moenkhausii* sp. nov.

Type No. 10,001, a specimen 43 mm. (251 in part), a brook near Arroyo Trementina.

Co-type No. 10,002, one specimen (251 in part), taken with the type.

Co-types No. 10,003, nine specimens (255), a brook near Arroyo Trementina.

This species is related to *Tetragonopterus paucidens*, from which it differs in the depth, the greater number of scales and absence of caudal spot.

A symmetrical, elongate species. Depth $3\frac{1}{2}$. Snout blunt. The dorsal and ventral profiles of the head alike. Body deepest just before the ventrals, tapering gently both above and below to the caudal. Scales moderate. Lateral line complete.

Head short, 4 in the length, its depth $1\frac{1}{6}$ in its length. The opercle narrow, its width more than 2 in its depth. The maxillary moderately long, extending to beneath the anterior rim of the orbit, two small teeth in its upper end.

The eye moderately large, 3 in the head, 1 in the interorbital.

Dorsal rays 9. Height of dorsal slightly less than the length of the head. The origin of the dorsal falls just back of the insertion of the ventrals.

Caudal moderate, the depth of the cleft about $\frac{2}{3}$ the length of the lobes.

Anal moderately long, its first 5 rays high, equal to distance from tip of snout to posterior margin of preopercle; the last half of the anal but $\frac{1}{2}$ as high.

Pectorals small, reaching $\frac{2}{3}$ distance to ventrals.

Ventrals small, reaching $\frac{2}{3}$ distance to origin of anal.

In formalin the specimens are almost without color. In some the middle caudal rays are dusky, and a grayish band, probably silvery in life, extends from the base of the caudal to the humeral region. The fins are immaculate.

Scales $5\frac{1}{2}$ –37– $4\frac{1}{2}$; A. 19–26; D. 9; depth $3\frac{1}{2}$; head 4; eye 3. The following table gives the measurements of eight specimens:

	Min.	Max.	Average.
Length in mm.....	37.0	46.0	40.5
Depth	3.5	3.75	
Head.....	4.0	4.0	
Eye	2.5	3.0	
Teeth in maxillary	2	2	
Anal.....	19.0	26.0	

Scales 4.5 to 5.5–35 to 38–4 to 4.5.

73. *Tetragonopterus orbicularis* Cuv. and Val.

Four specimens (252), Arroyo Trementina. It is possible that these specimens are the young of *chalceus*. Depth 2 in the length; Lat. l., 35.

74. *Tetragonopterus chalceus* Agassiz. Mojarra.

Tetragonopterus rufipes Val. in D.Orb. Voy. Amer. Merid. Poiss, Pl. 11, fig. 1.

Four specimens, Asuncion (86, 13); Arroyo Trementina (256). Anal 34–37; lat. l., 30 or 31.

The description of *rufipes* makes it a distinct species, but the figure shows it to have an anal much shorter than that described.

75. *Brycon hilarlii* (Cuv. and Val.).

Chalceus hilarlii Cuv. and Val., XXII, 246, 1848; Castelnau Anim. Amer. Sud. Poiss., 68, Pl. 36, fig. 1, 1855; Kner, Denksch. Acad. Wien, 1860, XVIII, 10.

Brycon hilarlii Günther, Cat. Fish Brit. Mus., V. 336, 1864.

Chalceus orbignyianus Cuv. and Val., XXII, 249, Kner, l. c., 11. (Rio de la Plata, Rio Guaporé.)

One specimen (194), 21 cm., Arroyo Trementina.

Head $4\frac{1}{4}$; depth $3\frac{1}{4}$; D. 11; A. 27; V. 8; P. 14; scales 15–75–12.

A robust species. Body moderately deep, depth $3\frac{1}{4}$. Upper profile of head nearly straight to base of occipital process, where the profile rises slightly more rapidly for about $\frac{1}{3}$ way to the origin of the dorsal; the other $\frac{2}{3}$ almost straight and rising to the origin of the dorsal at a

very low slope. From the last ray of the dorsal to the adipose almost straight. Caudal peduncle deep, compressed. Ventral profile evenly curved from the isthmus to the origin of the anal. Belly round to the ventrals, keeled between the ventrals and the anus.

Head short and heavy, $4\frac{1}{4}$ in total length, height to base of occipital process $1\frac{1}{4}$ in length.

Eye large, $3\frac{1}{2}$ in head, 2 in the interorbital. Snout short, equal to eye, $3\frac{1}{2}$ in head.

Each intermaxillary with an outer series of about 9 small, even tricuspid teeth. Behind each of these runs a more irregular series of slightly larger tricuspid teeth. Behind the inner ends of these 4 runs a cross series of about 4 or 5 larger five-cuspid teeth. Maxillaries narrow, straight, not sheathed by the preopercle, each with a single series of fine teeth extending about $\frac{2}{3}$ its length. Mandible with an outer series of tricuspid teeth, the forward 6 on each side much larger than the others. Of these six the second is the largest, the first and third are equal, the others are smaller. Just behind the center of this series are 10 very small conical teeth.

The upper lip is very thin and adnate. The lower is thick and free, and at the outer ends it thins out and the free edge turns down to join the point of the maxillaries.

The tongue is thick, soft and adnate. The rami of the dentary wide apart; the four branchiostegals exposed. Gill-rakers setiform, gill-membranes united in front but free from the isthmus. The longest ray of dorsal 5 in length. Origin of dorsal in the middle of the length, just back of the insertion of the ventrals; the shortest ray 3 in the longest.

Pectorals $1\frac{2}{3}$ in head, not reaching ventrals. Ventrals $1\frac{1}{2}$ in the head, reaching the anus. Anal moderately high, its last ray $1\frac{2}{3}$ in the third, the latter $\frac{2}{3}$ of the anal sheathed by scales for about $\frac{1}{3}$ its height.

Caudal but slightly indented; its middle ray $2\frac{2}{3}$ in the head.

Adipose over the last anal rays.

Color in formalin: Flesh color, darker above; a faint humeral spot and a large black spot at the base of the caudal and extending to the ends of the middle caudal rays. An indistinct blotch on the opercle. The snout and top of the head dark. A faint suggestion of longitudinal striations following the lines of scales.

76. *Chalcinus angulatus curtus* Garman. Pira guira.

Nine specimens, Asuncion (146, 75); Estancia La Armonia (26); Arroyo Trementina (184); Campo Grande (266).

77. *Gasteropelecus stellatus* Kner.

Nine specimens (69), Laguna Pasito, Asuncion.

78. *Characinus gibbosus* (Linn.).

Three specimens (192), Laguna of Arroyo Trementina.

Head $3\frac{3}{5}$ – $3\frac{5}{6}$; depth $2\frac{2}{5}$ – $2\frac{3}{5}$; lat. l., 55–59; D. 10 or 11; A. 50–53.

79. *Characinus squamosus* sp. nov.

Type No. 9,961, a specimen (72), 215 mm., Pasito Laguna. This species is at once distinguished by its small scales and long anal.

Head 4; depth $3\frac{2}{5}$; D. 12; A. 54; P. 14; V. 8; lat. l., 112.

Profile nearly straight from tip of snout to nape. At the nape it rises abruptly for about $\frac{1}{4}$ of the distance to the dorsal, from which point to the origin of the dorsal the slope is very gradual. The slope of the back from the origin of the dorsal to its last ray is downward and rather steeper than from the dorsal to the caudal peduncle, which slope is also very slightly convex.

Lower sides of body evenly curved from the tip of snout to vent. The base of the anal nearly straight.

Anterior portion of the head shaped very much as in *Cynopotamus kneri*.

Snout elongate, 3 in length of head. Eye large, $4\frac{3}{5}$ in head, $1\frac{1}{3}$ in interorbital.

A narrow, unscaled, occipital process equal to the snout in length. Suborbitals moderate, only half covering the lower part of the preopercle. The angle of the preopercle rounded, not with a backwardly projecting angle as in *C. gibbosus*.

Maxillary almost straight, reaching far beyond the eye, finely toothed its entire length. Mandible when closed shorter than snout.

Premaxillary teeth in two series; the outer contains 2 canines in front and a smaller one on each side at the end of each premaxillary bone; the inner series of two smaller canines on each side. Maxillary with a single series of teeth its entire length.

Mandibular teeth in a single series in the following order: 1st, ten minute teeth; 2d, a canine corresponding to the upper front canine; 3d, a small canine pointing obliquely upward and outward; 4th, a large canine fitting into a cavity in the upper jaw; 5th, a small canine corresponding to the upper posterior canine and followed, 6th, by a series of closely set small teeth.

Dorsal slightly falcate, its longest ray 5 times in total length to tip of middle caudal rays. Pectorals to middle of ventrals. Ventrals not reaching origin of anal. Anal long and low, its fourth ray the longest, $2\frac{1}{3}$ times length of last ray. Caudal forked, scaled well up on the lobes.

Lat. line 112, almost straight, very slightly decurved in front.

Scales small and roughened on the entire exposed surface; 22 from origin of dorsal to lateral line and 24 from lateral line to origin of anal.

Dark above, lighter below, with a distinct silvery lateral band just above the lateral line. At the base of the caudal a black spot.

A second specimen (45) of a *Characinus*, No. 9,969, 22 mm., also from Pasito, agrees with the species just described in those characters in which *squamosus* differs from the other species of *Characinus*, having A. 54, lat. l., about 106; the general shape and dentition just as described for the type of *squamosus*. It differs, however, in the most striking way in color. In addition to the caudal spot the tip of the lower jaw, a spot in front of the dorsal, a very large band on the proximal $\frac{2}{3}$ of the first 9 dorsal rays just above the base, and a small spot each at the upper and lower margins of the origin of the caudal are jet black; a fainter small black spot in front of the anal.

Head $3\frac{3}{4}$; depth $3\frac{1}{5}$; D. 12; A. 54.

The color markings are so well defined and intense that it is scarcely conceivable that they should disappear entirely in the adult, and yet the similarity in other respects is so great that we hesitate to give it a separate name.

80. *Ræboides prognathus* (Boulenger).

Twelve specimens (45, 73, 147), Pasito Laguna.

D. 10; A. 48-54; lat. l. 75-84; depth $2\frac{3}{5}$ -3; head $3\frac{1}{2}$ - $3\frac{3}{4}$.

A dark spot in the largest specimens above the lateral line, just behind the end of the occipital process.

A median oval black spot on middle caudal rays and end of caudal peduncle. A black vertical line bordering the caudal peduncle behind and ending above and below in slight enlargements.

81. *Ræboides microlepis* (Reinh.). Pirai.

Four specimens (79, 139), Rio Paraguay at Asuncion. These specimens differ considerably from those hitherto figured and described.

D. 10 or 11; A. 53-56; depth $2\frac{1}{6}$ - $2\frac{2}{5}$; head $3\frac{3}{4}$ -4; lat. l., 97-100; eye 3 - $3\frac{3}{4}$.

82. *Salminus brevidens* (Cuvier). Dora dillo (golden).

Hydrocyon brevidens Cuv., Mem. Mus., V, 364, Pl. 27, fig. 1. Valenciennes in d.Orb', Voy. Amér. Sud. Poiss., 10, Pl. 9 fig. 3.

Salminus brevidens Müller and Troschel, Horæ Ichthyol., I, 16; Steindachner, Fisch-Fauna des Cauca und Flusse bei Guayaguil, 31, 1880. (Parana.)

Salminus maxillosus Cuv. and Val., XXII p. 62; Castelnau, Anim. Amer. Sud. Poiss., 61, Pl. 30, fig. 2; Günther, Cat. Fish. Brit. Mus., V 350, 1864; Günther, Ann. and Mag. Nat. Hist., 1880, 13 (La Plata); Boulenger, Trans. Zool. Soc. Lond., XIV, 37, 1896. (Paraguay.)

Three specimens (37, 89, 262), Rio Paraguay at Asuncion. A. 26; lat. l., 92-100.

83. *Acestrorhynchus*⁶ *falcatus* (Bloch).

Salmo falcatus, Bloch, taf. 385.

Xiphorhynchus falcatus Agassiz, *Selecta Genera et Species Pisc.*, 76, 1829; Cuv. and Val., XXII, 337; Castelnau, 75 (Amazon).

Xiphorhamphus falcatus Müller and Troschel, *Hor. Ichthyol.*, I, 17, 1845 (name only); *id.* in Schomburgk *Reisen in Brit. Guiana*, 635, 1848 (Essequibo, Pomeroun); Kner, *Denkschr. Acad. Wiss. Wien*, XVIII, 57, 1860 (Matto Grosso); Günther, *Cat. Fish. Brit. Mus.*, V, 354, 1864; Eigenmann and Eigenmann, *Proc. U. S. Nat. Mus.*, XIV, 58.

Xiphorhamphus ferox Günther, *Ann. and Mag. Nat. Hist.*, XII, 443, 1863 (Essequibo); Günther, *Cat. Fish. Brit. Mus.*, V, 355 (Essequibo); Boulenger, *Trans. Zool. Soc. Lond.*, XIV, Pt. II, 37, 1896 (Paraguay).

The *X. ferox* of Günther differs from *falcatus* chiefly in the length of the maxillary, also in the size of the eye, the scales, etc. Both species have been found in the Essequibo river. We have four specimens (33 and 49), ranging from 22 cm. to 27 cm., from the Rio Paraguay at Asuncion. There is no doubt that these specimens belong to the same species. Their measurements are as follows:

27 cm. A. 24, Scales 107, Eye $6\frac{1}{2}$, Snout $2\frac{2}{3}$, Depth $3\frac{2}{3}$, Max. 1 diam. beyond eye.

25 cm. A. 27, Scales 106, Eye 6, Snout $2\frac{3}{5}$, Depth $3\frac{3}{5}$, Max. 1 diam. beyond eye.

23 cm. A. 27, Scales 97, Eye $5\frac{1}{3}$, Snout $2\frac{1}{3}$, Depth $3\frac{1}{3}$, Max. $\frac{1}{3}$ diam. beyond eye.

22 cm. A. 27, Scales 103, Eye $5\frac{1}{3}$, Snout $2\frac{3}{5}$, Depth 4, Max. $\frac{2}{5}$ diam. beyond eye.

The measurements nearly bridge the differences said to exist between *falcatus* and *ferox* in the number of anal rays, the scales and length of the maxillary. We have, therefore, placed *ferox* provisionally in the synonymy of *falcatus*, of which it is probably the young. A specimen of *X. falcatus* in the collections of the Indiana University from "Brazil," 22 cm., differs from our smallest specimen in the shape of the mouth and the extent of the maxillary. The maxillary extends for a distance equal to $\frac{2}{3}$ diameters of the eye beyond its posterior border. This difference is in part due to the greater length of the maxillary, and also in part to the fact that it makes less of an angle where it joins the premaxillary.

In the absence of specimens from the Rio San Francisco the *X. lacustris* of Reinhardt is kept distinct. It is unquestionably a local race of *falcatus*, if it is not identical with it.

84. *Acestrorhamphus*⁷ *hepsetus* (Cuv.) Blanquillo.

One specimen (15), Laguna at Asuncion. As this specimen differs from the available figures of *hepsetus*, especially in the pectoral, and may represent a distinct species, a description is added.

Head $3\frac{3}{5}$; depth $3\frac{1}{2}$; D. 11; A. 30; scales 13-75-10.

⁶ New for *Xiphorhynchus* Agassiz, preoccupied.

⁷ New for *Hydrocyon hepsetus* Cuv.

Form moderately elongate. Snout moderate, 3 in head. Upper profile slightly concave from tip of snout to apex of occipital process; slightly convex from there to the origin of the dorsal. Profile of belly almost straight from origin of pectorals to origin of anal.

Scales moderate, very regularly arranged.

Palatines each with a single series of strong conical teeth, those in front larger than the others; premaxillaries, maxillaries and mandible each with a single series of conical teeth; two canines in each intermaxillary, one at the front end and the other $\frac{2}{3}$ the way back. Maxillary not covered by the preopercle. No canines in the maxillary, the teeth pointing backward and largest about the middle of the series. Mandible heavy, tapering rapidly to the point; its rami close but not touching along the under side. Four canines in each side of the mandible, a large one on each side in front; a moderate-sized canine about mid-way of the mandible, and between them two small canines on each side; back of each posterior canine a single series of fine conical teeth; no fine teeth between the canines.

Gill-rakers moderate, setiform. Eye large, 4 in head. Preorbital narrow. Suborbitals broad.

Origin of dorsal half-way between tip of snout and tip of the middle caudal rays; its second ray $5\frac{1}{3}$ in the length, its last ray 3 in the second.

Caudal moderately forked, the lobes pointed; posterior $\frac{2}{3}$ of anal long and low, its last third produced in a round lobe.

Ventrals reaching $\frac{2}{3}$ distance to origin of anal, $1\frac{3}{4}$ in head.

Pectoral $1\frac{2}{3}$ in head, reaching to base of the ventrals.

Color silvery, darker above; caudal reddish, 4 or 5 of the center interradiar membranes black; a black basal spot.

85. *Cynodon vulpinus* ^{spix.}

One specimen (270), Rio Paraguay at Asuncion.

86. *Serrasalmo humeralis* Cuv. and Val. Pirana.

Three specimens (78, 193, 204), Rio Paraguay at Asuncion; Arroyo Trementina.

D. 16; A. 36; lat. l., 74-78; head $2\frac{1}{3}$; depth $2-2\frac{1}{5}$.

87. *Serrasalmo spilopleura* Kner. Pirai (pirai = fish, tai = tooth).

Two specimens (74, 203), Rio Paraguay at Asuncion; Arroyo Trementina.

D. 15; A. 32; lat. l., 80; head $3-3\frac{2}{7}$; depth $1\frac{5}{6}-1\frac{5}{7}$.

88. *Metynnis mola* sp. nov.

Type No. 10,049, one specimen (part of 191), Arroyo Trementina.

Co-types Nos. 10,050-10,051, two specimens (part of 191), Arroyo Trementina; 75 and 85 mm.

Head $3\frac{2}{3}$; depth $1\frac{1}{4}$; D. 15 or 16; A. 38-40; lat. l., 72-75.

Ventral serræ in the co-types 34 and 36; of these there are in one 22 simple spines, 9 with a double (anterior and posterior) tip and 3 bilateral ones; in the other there are $21 + 11 + 3$.

Form nearly circular. The dorsal profile is very slightly concave at the occiput and the ventral profile about equally concave at the isthmus. Lateral line but slightly decurved near its anterior end.

The distance from the origin of the dorsal to the lateral line $\frac{2}{3}$ distance between lateral line and lowest point of the ventral profile.

Supraoccipital process extending $\frac{1}{3}$ to origin of dorsal.

Length of head less than its depth by $\frac{1}{3}$ diameter of eye. Posterior outline of opercle much flattened, its width $3\frac{1}{2}$ in its depth. Suborbitals very narrow, leaving the cheek entirely naked. Maxillary oblong, directed straight downward. Mandible with an outer row of 10-12 strong teeth with oblique cutting edges and an inner row of 2 conical teeth at the symphysis. Premaxillary with an outer row of 6-8 medium-sized teeth similar to those in the mandible, and an inner row of 6-8 heavy broad-tipped teeth close against the outer row and alternating with them. The outer row lacks the middle tooth.

Snout equals $\frac{1}{2}$ diameter of eye. Eye large, $2\frac{1}{2}$ in head, $1\frac{1}{3}$ in inter-orbital.

Base of dorsal $1\frac{1}{3}$ in its height, which equals depth of head.

Distance between dorsal and adipose dorsal $1\frac{1}{2}$ in base of dorsal, 1 in base of adipose. Height of adipose about $3\frac{1}{2}$ in its length.

Caudal broad, widely emarginate, its middle rays 3 times in distance between tips of its lobes. Caudal peduncle small, its depth equal to diameter of eye.

Pectorals small, $1\frac{1}{2}$ in head. Ventrals very small and narrow, equal to pectorals, not reaching vent.

Anal slightly lower at its posterior end than at its anterior, its posterior margin slightly convex.

Color light brown, with 7-8 irregular bars and a few indistinct spots of darker above the lateral line. Fins immaculate.

This species stands nearest to *M. lippincottianus*, from which it differs in the greater depth, in the more evenly rounded ventral profile and in a narrow subopercle.

89. *Myelus tiete* Eigenmann and Norris.

A specimen of this species was overlooked when the report on the fishes of S. Paulo, Brazil, was prepared (*Revista do Museu Paulista*, IV, 1900). The type was but 30 mm.; the present specimen is much larger, measuring 155 mm. It differs from the type considerably in proportions and in color.

D. I, 26; A. II, 33; abdominal serræ 36 (+8 double ones); lat. l., about 80.

Head 4; depth $1\frac{2}{5}$. Abdominal profile very greatly arched, more or less angulated at the origin of the anal. The anal basis inclined at an angle of about 45 degrees. Dorsal profile regularly arched from nostrils to caudal peduncle, highest at the first dorsal ray; snout decurved. Suborbital narrow, the cheeks mostly naked.

Eye $2\frac{2}{3}$ in head, nearly 2 in interorbital.

Anal distinctly falcate, the first ray heavy, leathery, about equal to the head in length. Dorsal and caudal naked; anal narrowly scaled at its base.

Dark above, light below with metallic reflections, no markings such as are seen in the young.

90. *Mylossoma*⁸ *albiscopius* (Cope). Piraña, Palometa.

Two specimens (2, 85), Rio Paraguay and Laguna at Asuncion.

91. *Colossoma*⁹ *brachypomus* (Cuv.). Pacú.

One specimen (261), Rio Paraguay at Asuncion. This specimen, 540 mm. long, lacks an adipose dorsal fin.

92. *Symbranchus marmoratus* Bloch. Piramboi (Pira = fish, mboy = snake).

Five large specimens (136), Asuncion (152), Campo Grande; Pirayu. Nine young (103), Rio Branco.

93. *Sternarchus albifrons* L.

One specimen (199), Arroyo Trementina.

94. *Hypopomus brevirostris* Steindachner.

Four specimens (108, 158, 220), Matto Grosso or Asuncion. Campo Grande and Arroyo Chagalalina.

95. *Eigenmannia virescens* (Val.).

Two specimens (109 and 200), Matto Grosso or Asuncion, Arroyo Trementina.

96. *Giton fasciatus* (Pallas). Anguilla.

Four specimens (21, 161, 198), Estancia La Armonia, Campo Grande; Arroyo Trementina.

97. *Fundulus* (?) *paraguayensis* sp. nov.

Type No. 10,064, a female, with ripe eggs, 57 mm. (222). Laguna near Arroyo Trementina.

D. 10; A. 12; lat. l., 34; head $3\frac{1}{2}$; depth 4.

Elongate, rather slender, compressed from anus backward. Dorsal and ventral profile nearly equally arched to above the ventrals. Head

⁸ New for *Myletes albiscopius* Cope.

⁹ New for *Myletes oculus* Cope.

subpyramidal, the mouth small, the lower jaw projecting, its tip on a level with the upper margin of the pupil when it is closed; outer teeth enlarged. Eye greater than snout, $3\frac{1}{2}$ in head, $1\frac{1}{2}$ in interorbital. Pre-orbital $\frac{2}{5}$ the diameter of the eye. Dorsal placed far back, its origin slightly in advance of that of the anal, its distance from the eye twice its distance from the middle caudal ray. The last rays of the dorsal and anal reaching caudal. Height of dorsal and anal equal to the postorbital part of the head. Caudal rounded, about equal to the head in length. Ventrals small, reaching past anus but not to anal; pectorals not quite reaching ventrals, equal to head less one-half snout.

Dark brown, four light bands on the posterior half of the body, most marked between the dorsal and anal; ventral surface and region along either side of anal colorless. Dorsal and anal fins with about four longitudinal dark bands alternating with light. Caudal with numerous irregular cross-bars of alternating light and dark. Ventrals and pectorals more faintly and irregularly barred.

The single specimen is a female with ripe eggs. With the present material it is impossible to determine whether the species is viviparous or not. The generic position of the specimen is therefore in doubt.

98. *Tylosurus amazonicus* (Steind.). *Pez de espala.*

One specimen (32), Laguna Asuncion.

99. *Plagioscion ternetzi* Boulenger. *Corubina.*

Two specimens (41), Asuncion, Rio Paraguay.

This species is rare, but one of the finest food fishes. The specimens differ from Boulenger's type in having conspicuous black axillary spots.

100. *Pachyurus bonariensis* Steindachner. *Corubina.*

Three specimens (1, 144, 201), Laguna of Rio Paraguay at Asuncion; Laguna of Arroyo Trementina.

ANALYSIS OF THE GENERA AND SUBGENERA OF AMERICAN CICHLIDÆ

- a.* Spinous and soft portions of the dorsal of equal extent, or the former the longer.
- b.* First gill-arch normal (without additional lobe above).
- c.* Gill-rakers long.
- d.* Gill-rakers close set and very long, setiform, numerous (about 85).
- e.* Anal spines 3, alternating. Body compressed, oblong, covered with scales of moderate size. Dorsal spines numerous (13 or 14). Each jaw with a front series of small awl-shaped teeth, behind which is one or more series of smaller teeth. Cleft of mouth of moderate width. Scales on cheeks in 5 or more series. Soft dorsal and anal naked, 1. *CHÆTOBRANCHUS*.

- cc.* Anal spines 6. Dorsal spines 15 or 16. Preorbital less than orbit in width. Scales on cheek in 3 or 4 series. Soft dorsal and anal scaled, 2. *CHÆTOBRANCHOPSIS*.
- dd.* Gill-rakers stiff, lanceolate, crenulate on inner margin. Perciform. Scales small. Spinous and soft dorsals of nearly equal extent, and separated by a notch. Anal spines 3. Each jaw with a broad band of villiform teeth. Dorsal and anal fins scaled, 3. *CICHLA*.
- ec.* Gill-rakers short and few.
- f.* Vertical limb of preopercle entire.
- g.* Scales of the lateral line much longer than the others. About 2 transverse series of scales in the anterior part to each scale of the lateral line. First series of teeth incisors, separated from the rest by a moderate space, 4. *UARU*.
- gg.* Scales of the lateral line not larger than the others.
- h.* A series of incisors, a band of villiform teeth behind them. Anal with 8 spines, 5. *NEOTROPLUS*.
- hh.* Teeth all conical, the front series remote or not.
- i.* Premaxillary very greatly protractile.
- j.* Anal spines 3.
- k.* Lateral line not overlapping. Snout equal to postorbital portion of head. Mouth oblique, preorbital narrow ($\frac{1}{2}$ orbit). Nostrils nearer tip of snout than eye, 6. *ACAROPSIS*.
- kk.* Lateral line with the upper and lower limbs overlapping. Snout much produced, more than twice the length of postorbital portion of head. Preorbital very large, nearly twice as wide as the eye. Nostrils much nearer orbit than tip of snout. Mouth low, nearly horizontal. Premaxillary an orbital diameter below the eye. Caudal densely scaled. Maxillary reaching to nostrils, 7. *RETROCOLUS*.
- jj.* Anal spines 6. Snout not greater than postorbital portion of head. Preorbital narrow. Mouth oblique, premaxillary on level of lower third of eye, more protractile than in the other genera. Maxillary reaching to front margin of eye. The origin of the ventral falls vertically below that of dorsal, 8. *PETENIA*.
- ii.* Premaxillary comparatively little protractile.
- l.* Ventrals inserted behind origin of dorsal.
- m.* Cheeks scaled.
- n.* Jaws subequal.
- o.* Anal spines 3.
- p.* Soft portions of vertical fins densely scaled to near the tip; dividing line between fins and body indistinct. About 6 of the anterior teeth of lower jaw enlarged canines, 9. *ASTRONOTUS*.
- pp.* Soft portions of dorsal and anal naked or scaled on base only. Caudal scaled at its basal half. Lower jaw without enlarged canines, 10. *ÆQUIDENS*.
- oo.* Anal spines more than 3, some of the teeth usually enlarged, often canine-like.
- q.* Lower lip with a frenum, its folds interrupted mesially, 11. *CICHLA*.

- r. Anal spines 4 to 9, (CICHLISOMA).
 rr. Anal spines 10 to 11, (ARCHOCENTRUS).
 qq. Lower lip without frenum, forming a free fold for its whole length,
 12. HEROS.
 nn. Upper jaw projecting. Anal spines four. Cleft of mouth short.
 Scales on cheek small, in more than 5 series, . . 13. THERAPS.
 mm. Head entirely naked. Scales of nape very small, extending to
 the occipital region. Scales large, lateral line 24+15. Mouth
 large. Nares very minute, at the tip of the snout. Gill-mem-
 branes united to the isthmus; gill-rakers small.
 14. BOGGIANIA.¹⁰
 ll. Ventrals in front of origin of dorsal, 15. MESONAUTA.
 ff. Vertical limb of preopercle serrate.
 s. Jaws equal. Scales rather large, those of the lateral line equal
 ordinary scales in size.
 t. Body short and deep as in *Astronotus*, 16. CRENICARA.
 tt. Body elongate, as in *Crenicichla*, 17. DICROSSUS.
 ss. Lower jaw much projecting. Mouth wide, snout depressed. Fewer
 scales on the lateral line than in the series just above it.
 18. CRENICICHLA.
 bb. First gill-arch with a downward projecting lobe on its upper limb,
 the rakers carried on the free margin of this limb (eggs carried
 in the gill chamber).
 u. Preorbital not deeper than eye. Eye equidistant from tip of snout
 and upper angle of gill-opening, 19. BIOTODOMA.¹¹
 uu. Preorbital in adult prolonged, much deeper than the eye. Eye
 placed high, much nearer upper angle of gill-opening than tip
 of snout, 20. GEOPHAGUS.
 v. Base of dorsal fin without scales, 21. (SATANOPERCA).
 vv. Base of dorsal scaled, 22. (GEOPHAGUS).
 aa. Soft portion of dorsal longer than spinous portion.
 w. First gill-arch with a downward projecting lobe above, as in *Geo-*
phagus. Anal spines 3, dorsal spines 7 or 8. Body very long.
 Preopercle entire. 23. BIOTÆCUS.¹²
 ww. First gill-arch normal. Body short and deep.
 x. Gill-rakers obsolete. Anal spines 6 to 10. Covered with small
 ctenoid scales. Soft dorsal and anal scaly. Teeth small, occu-
 pying only the symphyseal portion of jaw. Mouth small, very
 oblique, 24. SYMPHYSODON.
 xx. Gill-rakers setiform. Anal spines six, graduated. Narrow
 bands of teeth in the jaws. Mouth small, oblique. Anterior

¹⁰ *Boggiania*, Perugia, *Di Alcuni Pesci Raccolti nell' alto Paraguay*, 2, 1897 (*ocellata*).

This genus is by Perugia considered to be closely related to *Crenicichla*, but if his description is correct it is very different from this genus or any other genus of this family.

¹¹ *Biotodoma*, new for *Mesops*, which is preoccupied in Coleop., 1820. *βιοτος* living *δωμα*, a home, in allusion to their habit of carrying the young in the gills.

¹² New for *Saraca*, preoccupied in Lepid. 1865, *βιοτος*, living, *οικος* house, a home; in allusion to their habit of carrying their young in their gills.

parts of soft dorsal, anal, and first ventral ray much prolonged.
Caudal truncate, 25. PTEROPHYLLUM.

101. *Æquidens tetramerus* Heckel.

Many specimens from Rio Branco (102); Campo Grande (153); Estancia La Armonia (22); Arroyo Trementina (183, 250); Arroyo Carumbey (20); Tolducue (232, 233); Salamanca (258).

D. XV, 10 or 11; A. III, 8-10; lat. l., 14-18+7-9.

102. *Æquidens paraguayensis* sp. nov. Pira mbocaya.

Type No. 10,066, a specimen, 100 mm. (part of 66), Asuncion.

Co-types No. 10,067, nine specimens (66), Asuncion.

Co-types No. 10,068, five specimens (169), Laguna Asuncion.

Co-types No. 10,069, five specimens (190), Asuncion (?).

Co-types No. 10,070, ten specimens (238), Aquadas.

Other specimens are No. 10,071 (218), two Arroyo Pypucú; No. 10,073 (271), one Asuncion; No. 10,074 (217), four Arroyo Pypucú.

This species is evidently very closely related to *Æquidens dorsigera* (Heckel) and *Æquidens syspilus* (Cope). Steindachner states that *dorsigera* is characterized by a black spot on the spinous dorsal, which was present in all the numerous specimens examined by him. None of the specimens of the new species have such a spot. From *syspilus*,¹³ as far as the meager figure and description of Cope permit a comparison, this species differs chiefly in the number of scales and rays.

Description of the type:

Dorsal XIV, 9; A. III, 7; lat. line 16+10 (24 in the series which carries the posterior segment of the lateral line). Head $2\frac{3}{5}$; depth $2\frac{1}{8}$.

Elevated in front, head broad, eye above the tip of the snout, pre-orbital equals eye. Eye $3\frac{1}{4}$ in head, 1 in snout, slightly less than inter-orbital. Cheeks with three rows of scales; scales of the body large, of nearly uniform size. The middle rays of the soft dorsal and anal prolonged, reaching beyond middle of caudal, the longest dorsal ray reaching from tip of snout to second fifth of the pectoral. Caudal rays

¹³ Cope's description, *Proc. Acad. Sci. Phila.*, 1871, p. 255, of *syspilus* from the Ambyiaçu is as follows:

"Scales in three series on the cheeks, on the body 2-26-7. Radii D. XIV-XV, 9; A. III, 8; caudal rounded. Form elongate oval; depth of body 2.6 times in length without caudal fin, and equal depth of head. Preorbital bone half orbit (in specimen two inches long); orbit 2.5 times, head nearly twice interorbital space (doubtless much smaller in larger specimens). Profile convex; muzzle oblique; upper lip longer than mandible.

"Light brown, yellow below. A straight wide black band from the upper posterior margin of the orbit to below the end of the spinous dorsal, composed of three confluent spots; a black bar from eye to angle of preoperculum, and another across the base of the caudal fin. Seven vertical brown cross shades behind the head, on sides."

produced, filamentous. Dorsal spines of nearly uniform height, equal to $\frac{2}{3}$ the length of the head. Outermost ray of the ventrals produced, reaching to the end of the base of the anal. Pectorals reaching beyond origin of anal.

A series of faint cross-bars on the sides, a black band from the upper part of the eye to near the end of the spinous dorsal, much narrower on the head than on the body. A large black spot in the lateral band near the middle of the body. A dark band down and slightly back from the eye; a dark band across forehead. A black spot on upper half of base of caudal.

Other specimens differ from the type in some respects. Among all the specimens examined but one had XIII; one had XV instead of XIV dorsal spines; a few had 10 rays in the dorsal. The anal rays varied from 6-8. The tubes of the lateral line varied from 14-17 on the anterior limb and from 6-10 on the posterior.

The color varies much in intensity and the median lateral spot and bar down from eye are more conspicuous in the young than in the adult, while the lateral band is much less conspicuous in the young.

103. *Mesonauta festivus* (Heckel).

Two specimens (182), from a Laguna near Arroyo Trementina.

104. *Crenicichla lepidota* Heckel.

Seven specimens, Rio Branco, Matto Grosso (105); Campo Grande (156 and 157); Laguna near Arroyo Trementina (188); Arroyo Chagalalina (224); Arroyo Trementina (249).

105. *Crenicichla saxatilis* (Linn.).

One specimen (10), Laguna of Rio Paraguay.

106. *Geophagus duodecimspinosum* Boulenger. *Pira mbocaya*.

Eight specimens (3, 67, 76, 141), from the Laguna at Asuncion. There can be no doubt about the identification of the specimens before us with Boulenger's species, although none of them agree with the type in the number of spines. Boulenger gives D. XII, 14; A. III, 9; lat. line 18+9. Our specimens have the rays and scales as follows:

D. 13-14	A. III, 8	Lat. l. r. 20+12
D. 14-13	A. III, 9	Lat. l. r. 20+12
D. 13-13	A. III, 8	Lat. l. r. 21+11
D. 13-13	A. III, 9	Lat. l. r. 18+ 9
D. 13-15	A. III, 9	Lat. l. r. 21+11
D. 14-13	A. IV, 8	Lat. l. r. 20+11
D. 13-13	A. III, 7	Lat. l. r. 19+ 9
D. 14-12	A. III, 8	Lat. l. r. 21+ 8

The lateral line is interrupted at the caudal, being continued along

the lower lobe of the caudal fin. The caudal is obliquely truncate or slightly emarginate, the upper lobe being the longer. Sides with obscure cross-bars, otherwise as in the type.

107. *Geophagus pappaterra* Heckel.

One specimen (185), from the Laguna near the Arroyo Trementina. D. XVI, 10; A. III, 6; lat. line 19+10.

108. *Biotodoma trifasciatus* sp. nov.

Type No. 10,066, a single small specimen, 29 mm. (225), Arroyo Chagalalina.

Head 3; depth $2\frac{3}{4}$; D. X, 6; A. III, 5; lat. line, 7+9. 22 scales along median line. Streak along base of dorsal; lateral band from tip of snout to caudal spot; a narrow, well-defined oblique band from lower margin of pectoral to origin of anal and continued to tip of first ray dark; an oblique bar from eye down and back, outer rays and most of the base of the ventrals jet black, the rest of the fin colorless. Pectorals and caudal dusky. Dorsal with a black margin; anal dusky except the streak mentioned above, which is black. Fins yellow in life. Eye nearer snout than gill-slit, $\frac{2}{3}$ in snout, about $2\frac{3}{4}$ in head. Supplementary flap of first gill-arch well developed. Scales large; lateral line not well developed, the anterior part with only nine developed tubes, the last one of which is under the anterior half of the dorsal, only a partial scale between the last developed tube and the dorsal. Pectorals reaching to vent, ventrals to anal, soft dorsal and anal to caudal.

109. *Achirus jenynsii* Günther. Lenguado, Pira Kigua.

Six specimens (38, 42, 143), Asuncion, Rio Paraguay. March, 1900.

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The collection and study of fishes has been more active in the southern part of South America during the last fifteen years than in the northern. Several papers have appeared during this time on the fishes of Rio Grande do Sul, a larger number dealt with the fishes of one part or another of the La Plata system. None of these papers offer a comprehensive account of the fishes of the system, being rather reports on definite collections. We give below a list of the papers dealing with fishes of the La Plata basin published since 1890. The earlier papers are given in Eigenmann and Eigenmann, 1891.

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